



# Biodiversity at plot level

## Measuring ecosystem services across a residential mortgage portfolio

### Achmea Mortgages

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#### Key insights

- A detached home with a large garden can have less green cover than a terraced house on a plot a third its size. Ecosystem service delivery varies dramatically between properties and is mostly driven by homeowner behaviour, not property age or location.
- Achmea Mortgages has quantified this at plot level across the portfolio using satellite data. This is, to our knowledge, the first application of ecosystem service measurement across a residential mortgage portfolio.
- Targeted, modest interventions can measurably improve climate resilience at portfolio scale.

#### Introduction

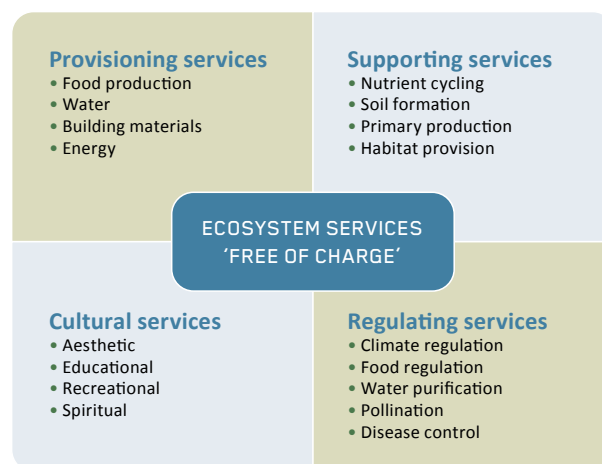
Dutch biodiversity has declined by approximately 85 percentage points in mean species abundance since 1900 (source: PBL), weakening the ecosystem services that support climate adaptation. Our previous [article](#) addressed the problem conceptually, addressing questions such as how nature-related risks can translate into financial-related risks and how investors can start integrating biodiversity considerations into strategy.

This article builds on the conceptual basis and operationalises it through analysing the biodiversity baseline of the Achmea Mortgages portfolio and introducing a methodology to quantify ecosystem services at plot level. To our knowledge, this represents the first application of plot-level ecosystem service measurement across a Dutch residential mortgage portfolio.

#### Biodiversity in a residential context

In urban and suburban areas, biodiversity is not limited to parks and public green space. Private plots, including gardens, yards and green roofs, deliver ecosystem services that matter for climate resilience: absorbing rainwater, cooling surroundings through shade and

evapotranspiration (mitigating the urban heat island effect, UHI), filtering air pollutants and providing habitat for pollinators. Where plots are largely paved or sealed, these services weaken, increasing exposure to flooding and heat stress, even if the surrounding neighbourhood appears green. These effects can be quantified at plot level using a natural capital accounting framework, and they affect not only physical climate risk but also residential quality and long-term asset resilience.



Ecosystem services per type (source: TNFD)

### How to measure biodiversity

Plot-level assessment captures differences between otherwise similar properties. Consider two detached houses on similarly sized plots: one largely paved, the other with grass, shrubs and mature trees. The second absorbs more rainfall and stays cooler during heatwaves. These are ecosystem services, the measurable benefits that functioning ecosystems deliver. Rather than measuring biodiversity at species level, the methodology works from ecosystem extent and condition to these services, following the CBS (Statistics Netherlands) Natural Capital Accounts and aligning with the TNFD's (Taskforce on Nature-related Financial Disclosures) LEAP approach. This makes the framework suitable for both environmental analysis and consistent portfolio reporting over time.

### Ecosystem condition

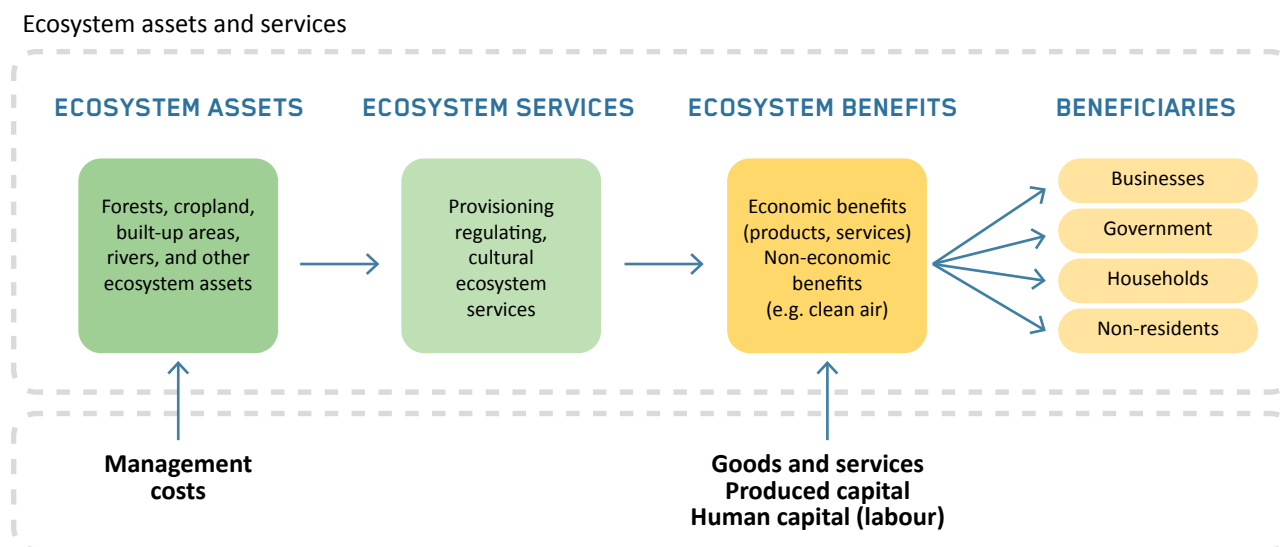
Five condition indicators are derived per plot from high-resolution satellite and aerial imagery: tree cover, shrub cover, grass cover, surface sealing, and local PM2.5/PM10 (air pollutant) concentrations. The first four capture vegetation extent. PM2.5 and PM10 levels characterise the context in which vegetation operates, as a plot in a high-pollution area needs greater filtering capacity to deliver the same air quality benefit.

### Ecosystem services

From these indicators, each plot's capacity to deliver ecosystem services relevant to risk exposure, residential quality and reporting is estimated:

Ecosystem service	What it captures	Key drivers
Protection against flooding from heavy rainfall	Water retention capacity based on surface composition	Permeable surface (grass, soil) and type of vegetation
Local climate regulation	Shade and evapotranspiration cooling	Canopy and vegetation cover
Air filtration	Capture of PM2.5	Amount and type of vegetation, local pollution levels
Pollinator habitat suitability	Structural suitability as habitat for pollinators	Presence and diversity of vegetation types, especially shrub and tree cover
Carbon sequestration	CO <sub>2</sub> absorption by vegetation and soil	Amount and type of vegetation, with trees contributing most

### NATURAL CAPITAL ACCOUNTING AND THE CONNECTION BETWEEN ASSETS, SERVICES AND FINAL BENEFITS (SOURCE: CBS)



All calculations follow the CBS Natural Capital Accounting handbook, adapted for plot-level data granularity, and are estimated in physical units such as millimetres of rainfall buffered or degrees of temperature reduction. These five services were selected for their clear relationship with plot-level characteristics and climate-related portfolio risks.

### Limitations

The methodology captures vegetation extent and structure but not species composition: a monoculture lawn and a wildflower meadow may score similarly. It is designed to complement existing climate and energy metrics, not to replace ecological field assessment.

### Biodiversity and the Achmea Mortgages portfolio

The results below present ecosystem condition and service delivery estimates across the Achmea Mortgages portfolio.

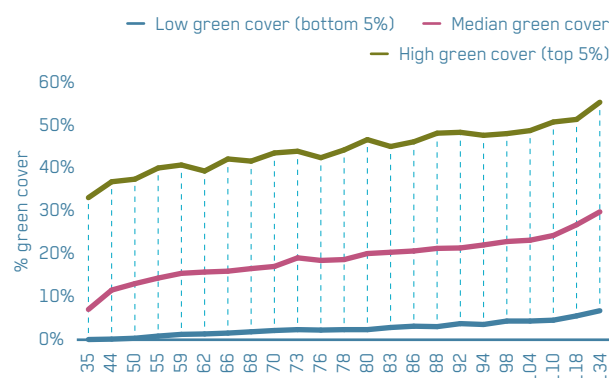
### Ecosystem condition

Plots of properties in the Achmea Mortgages portfolio (>100,000 properties) are on median covered by 22.3% greenery (17.8% grass, 1.6% tree, 2.9% shrub). Green cover varies substantially by housing type.

As terraced homes (45.5%) and detached or semi-detached homes (40.9%) make up the majority of the portfolio, these types drive the portfolio median. Green cover is not a derivative of garden size or property age. It is driven primarily by the choices individual owners make about how they use their

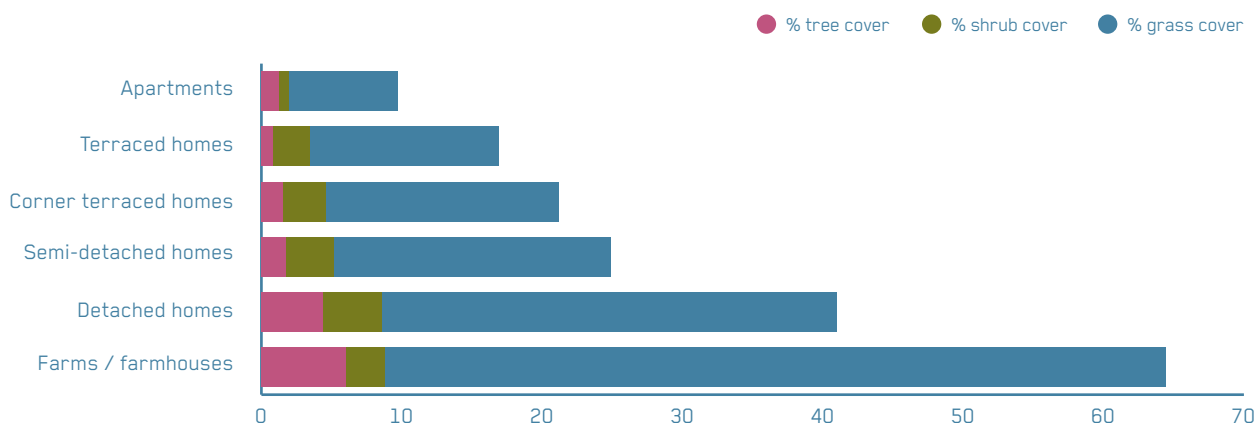
outdoor space. A property with a 400 m<sup>2</sup> garden and only 20% greenery cover has 80 m<sup>2</sup> of actual vegetation, the same as a home with a 133 m<sup>2</sup> garden that is fully greened at 60% cover.

FIGURE 2: RANGE OF GREEN COVER BY GARDEN SIZE FOR TERRACED HOMES

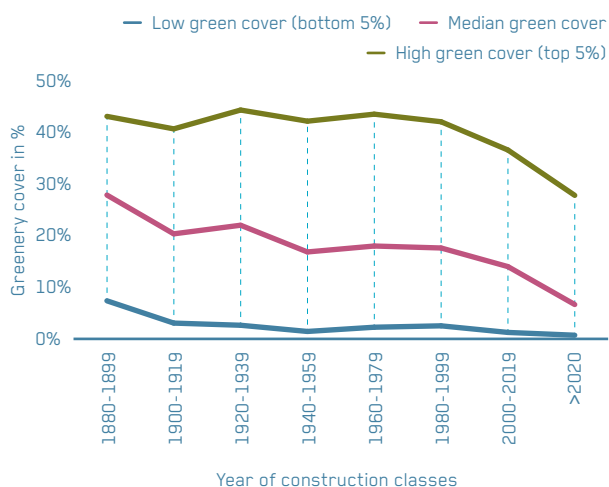


The graph *Range of green cover* shows the dispersion for terraced homes. 90% of properties have a green cover between the blue (low) and green (high) line. The orange line shows the typical property. For other housing types within the portfolio (excluding apartments) the picture is similar. Property age has a similarly modest effect. The median falls from 20.3% for properties built between 1900 and 1919 to 12.6% for properties built after 2010, but within each period the spread remains around 35%-points wide, dwarfing the decline between periods. This decline is also partly explained by median garden size falling from 88 m<sup>2</sup> for a terraced home built in 1970 to 65 m<sup>2</sup> for one built in 2020.

FIGURE 1: GREENERY COVER PER HOUSING TYPE WITHIN THE PORTFOLIO



**FIGURE 3: RANGE OF GREEN COVER BY YEAR OF CONSTRUCTION FOR TERRACED HOMES**

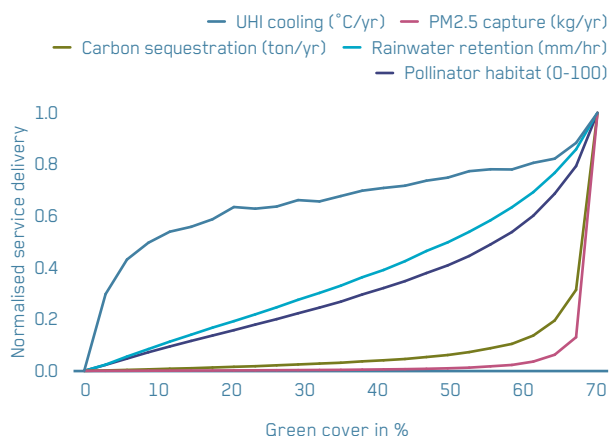


**Ecosystem services**

The ecosystem condition levels within the portfolio translate into the ecosystem services mentioned in the methodology.

All five ecosystem services increase with green cover, but at different rates. Pollinator habitat and rainwater retention benefit most, while air filtration and carbon sequestration depend more on tree cover and local pollution context. Properties in the lowest green cover quartile deliver substantially less across all services, as visible in the graph *Ecosystem service delivery*. All values are normalized, so the shape of the curves matters more than the absolute numbers.

**FIGURE 4: ECOSYSTEM SERVICE DELIVERY**



**Risks**

**Linking ecosystem services to climate risk**

Combining official climate risk data with plot-level green cover measurements shows where climate exposure and limited ecosystem service delivery overlap.

**Water nuisance**

- 16.5% of the portfolio is located in areas with high or very high water nuisance risk,
- Around 5% of the total portfolio combines this exposure with very low plot-level rainwater retention capacity (0–2 mm/hr or 2–4 mm/hr),

These properties face both elevated climate exposure and limited local buffering capacity.

**RISK OF WATER NUISANCE VERSUS RAINWATER RETENTION CAPACITY ON THE PLOT**

		Rainwater retention capacity				
		0–2 mm / hr	2–4 mm / hr	4–7 mm / hr	7–12 mm / hr	> 12 mm / hr
Risk of water nuisance	None	4.2%	5.2%	9.1%	14.1%	22.9%
	Low	1.9%	2.0%	3.2%	4.5%	6.2%
	Medium	1.4%	1.2%	1.7%	2.5%	3.3%
	High	1.4%	1.0%	1.4%	2.0%	2.9%
	Very high	1.7%	0.9%	1.1%	1.5%	2.6%



### WATER NUISANCE RISK CLASSES

	Risk	Description
<b>Water depth due to heavy rainfall</b>	None	No water depth measured
	Very low	≤ 10cm water depth
	Low	> 10-15 cm water depth
	Medium	> 15-20 cm water depth
	High	> 20-30 cm water depth
	Very high	> 30 cm water depth

### Heat stress

- 1.3% of the portfolio is located in areas with high heat stress,
- Around 0.3% of the portfolio combines this exposure with very limited cooling capacity at plot level (below 1°C).

### RISK OF HEAT STRESS VERSUS UHI COOLING

		UHI cooling				
		≤ 1°C	≤ 1.5°C	≤ 2°C	≤ 2.5°C	> 2.5°C
<b>Risk of heat stress due to warm nights</b>	None	0.0%	0.2%	1.2%	1.3%	0.2%
	Low	0.4%	7.8%	20.9%	14.5%	2.3%
	Medium	1.2%	12.2%	21.8%	12.2%	1.5%
	High	0.3%	1.0%	0.9%	0.2%	0.0%

### HEAT STRESS RISK CLASSES

	Risk	Description
<b>Heat stress caused by warm nights</b>	None	None
	Low	< 14 nights above 20°C
	Medium	4-21 nights above 20°C
	High	> 21 nights above 20°C

The overlap between climate risk and limited ecosystem service delivery exists within the portfolio, but is bounded by the number of properties facing higher climate risk. Ecosystem services add a dimension to existing climate risk assessments, identifying properties where climate exposure and limited green cover coincide.

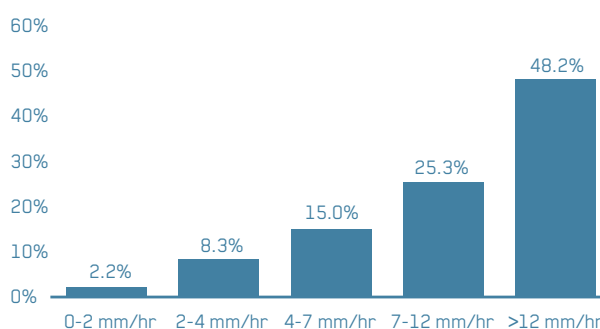
Whether the combination of climate exposure and limited ecosystem service capacity is reflected in property-level financial outcomes, such as valuation trajectories, maintenance costs or insurance claims, is a natural next question. This analysis does not test that relationship, but the plot-level data infrastructure now makes it possible to do so and identifies tail risk concentrations.

### Opportunities

#### Improving the climate resilience of the portfolio

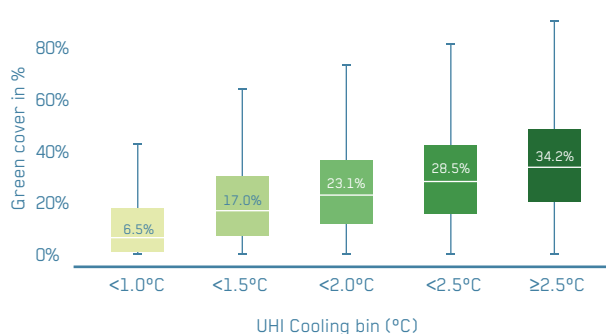
Modest increases in green cover can materially improve ecosystem service delivery. Properties with poor rainwater retention (below 2 mm/hour) have a median green cover of just 2.2%, while properties in the lowest cooling bin (below 1.0°C) sit at 6.5%. In both cases, relatively small increases in vegetation make a measurable difference. For rainwater, increasing green cover to 15%, roughly one small tree for an average terraced home, would shift retention capacity to 4 to 7 mm/hour, as visible in the graph *Green cover in % per rainwater retention bin*. In short, even limited greening interventions at the property level can move a home out of the worst-performing category and noticeably strengthen both water retention and local cooling.

FIGURE 5: GREEN COVER IN % PER RAINWATER RETENTION BIN (APARTMENTS FILTERED OUT)



For cooling, the relationship is less direct as vegetation type and neighbourhood context also play a role, but the gradient is clear: properties above 2.5°C cooling have a median green cover of 34.2%, as shown in the graph *Green cover in % per UHI cooling bin*. With 5% of the portfolio combining high water nuisance risk with low retention, and 0.3% combining high heat stress with low cooling, the case for targeted engagement is strongest where these overlaps concentrate.

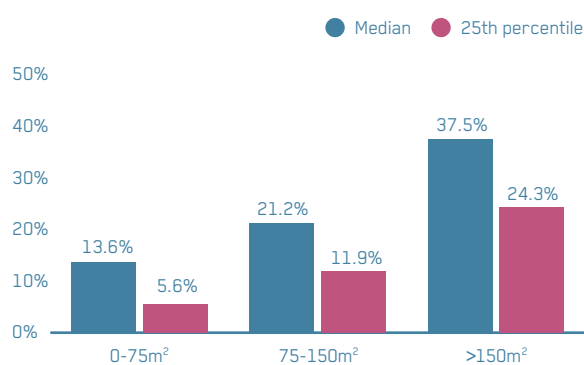
**FIGURE 6: GREEN COVER IN % PER UHI COOLING BIN (APARTMENTS FILTERED OUT)**



### Increasing biodiversity through property owner engagement

Because green cover is largely determined by individual owner behaviour, even modest engagement can have meaningful effects at portfolio scale. Across all garden sizes, the bottom 25% of properties have between 6% and 24% green cover, compared to a median of 14% to 37%.

**FIGURE 7: GREEN COVER OPPORTUNITY BY GARDEN SIZE (APARTMENTS FILTERED OUT)**



If the bottom 25% of properties reached the median green cover for their garden size, this would add approximately 87 hectares of green cover across the portfolio.

Beyond improving properties, the aggregate effect of owner engagement extends to the broader environment (inside-out impact). More green cover provides habitat for pollinators, cooling for surrounding streets and better water absorption during heavy rainfall. At portfolio scale, individual owner choices add up to a contribution to urban biodiversity.

### Integration with existing financing and engagement tools

Through the Green Loan part Achmea Mortgages already provides financing opportunities, like for creating a green roof with plants that improve biodiversity. Mortgagees can also use their Climate Voucher for a green roof, or to purchase subsidy help to improve the biodiversity and climate resilience of their garden. In the first quarter of 2026, Attens Hypotheken (an Achmea Mortgages label) started a pilot to provide new customers with a sustainable welcome package containing items to improve the biodiversity of their home, including a vertical garden.

### Conclusion

The analysis in this paper establishes a biodiversity baseline at plot level. Going forward it enables:

- Enhanced risk assessment by combining climate exposure with ecosystem service capacity;
- Longitudinal reporting alongside existing climate and energy indicators;
- Targeted engagement focusing on properties where small actions have outsized benefits.

Green cover and ecosystem services will be reported as portfolio-level metrics and integrated into ESG reporting. As data quality improves and regulatory frameworks evolve, the methodology will be refined accordingly.

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